THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	Anant Achyut Setlur et al.		
Application No.:	10/797,784	Examiner:	Johannes P. Mondt
Filed:	03/10/2004	Docket No.:	GLOZ 2 00169 RD29342

For: PHOSPHOR AND BLENDS T HEREOF FOR USE IN LEDS

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Respectfully submitted,
Fay Sharpe LLP

April 2, 2008
Date

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PATENT APPLICATION

THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Anant Achyut Setlur, et al.

Application No.: 10/797,784 Examiner: Johannes P. Mondt

Filed: 03/10/2004 Docket No.: GLOZ 2 00169

For: **PHOSPHOR AND BLENDS THEREOF FOR USE IN LEDS**

BRIEF ON APPEAL

Appeal from Group 2826

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I. REAL PARTY IN INTEREST

The real party in interest for this appeal and the present application are the inventors Anant Achyut Setlur, Alok Mani Srivastava, Holly Ann Comanzo, Dan Hancu and Linda Jane Valyou Briel, and the assignee of their interests, GELcore LLC.

II. RELATED APPEALS AND INTERFERENCES

Currently, there are no prior or pending appeals, interferences or judicial proceedings, known to Appellant, Appellant's representative, or the Assignee, that may be related to, or which will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

The status of the claims set forth in the Final Office Action mailed September 6, 2007 was, and is, as follows:

Claims 1-26, 38, 40-43, 45 and 46 are the subject of this Appeal.

Claims 27-34, 37 and 39 are allowed.

Claims 35, 36, and 44 are cancelled.

Claims 1-26, 38, 40-43, 45 and 46 are rejected.

IV. STATUS OF AMENDMENTS

No Amendment After Final Rejection has been filed in response to the Final Office Action dated September 6, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The invention of appealed claim 1 is directed to a lighting apparatus for emitting white light comprising a semiconductor light source emitting radiation and having a peak emission in the UV (page 2, paragraph 0024), and a phosphor composition radiationally coupled to the light source (page 2, paragraph 0025). The phosphor composition further comprises (Sr, Ba,Ca)$_2$SiO$_4$:Eu (page 3, paragraph 0036), one or more garnet phosphors having the general formula (Y,Gd,La,Lu,Tb,Pr,Sm)$_3$(Al,Ga,In)$_5$O$_{12}$:Ce (page 4, paragraph 0044), and at least one phosphor selected from the group consisting of (Sr,Mg,Ca,Ba,Zn)$_2$P$_2$O$_7$:Eu,Mn; (Ca,Sr,Ba,Mg)$_5$(PO$_4$)$_3$(Cl,F,OH):Eu,Mn; and (Sr,Mg,Ca,)MgAl$_{10}$O$_{17}$:Eu,Mn (page 4, paragraph 0045).

Appealed independent claim 14 is directed to a lighting apparatus for emitting white light comprising a UV light source emitting radiation having a peak emission in the UV range (page 2, paragraph 0024) and a phosphor composition radiationally coupled to the light source(page 2, paragraph 0025). The phosphor composition comprises (Sr,Ba,Ca)$_2$SiO$_4$:Eu (page 3, paragraph 0036), one or more garnet phosphors having the general formula (Y,Gd,La,Lu,Tb,Pr,Sm)$_3$(Al,Ga,In)$_5$O$_{12}$:Ce, and a magnesium fluorogermanate phosphor (page 4, paragraph 0044).

Third appealed independent claim 27 is directed to a lighting apparatus for emitting white light comprising a semiconductor light source emitting radiation having a peak emission in the UV range (page 2, paragraph 0024) and a phosphor composition radiationally coupled to the light source (page 2, paragraph 0025). The phosphor composition comprises (Sr,Ba,Ca)$_2$SiO$_4$:Eu (page 3, paragraph 0036) and one or more

additional phosphors. The $(Sr,Ba,Ca)_2SiO_4$:Eu phosphor comprises $(Sr_{0.95}Ba_{0.025}Eu_{0.025})_2SiO_4$, or $(Sr_{0.58}Ca_{0.36}Eu_{0.06})SiO_4$ (page 4, paragraph 0036).

Fourth appealed independent claim 40 provides a phosphor blend including $(Sr,Ba,Ca)_2SiO_4$:Eu, and at least one of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; and $(Sr,Ba,Ca)MgAl_{10}O_{17}$:Eu,Mn.(page 3, paragraph 0045).

Fifth appealed independent claim 46 is directed to a lighting apparatus for emitting white light (page 2, paragraph 0023) comprising a semiconductor having a peak emission in the UV range (page 2, paragraph 0025) and a phosphor composition radiationally coupled to the light source (page 3, paragraph 0031). The phosphor composition comprises $(Sr,Ba,Ca)_2SiO_4$:Eu, and at least one phosphor selected from the group consisting of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; and $(Sr,Mg,Ca,)MgAl_{10}O_{17}$:Eu,Mn. (page 3, paragraph 0045).

VII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

1) Whether Claims 1-13, 14-26, 38, 40-43, 45 and 46 are properly rejected under 35 U.S.C. §112 for failing to comply with the written description requirement.

2) Whether Claims 1-7, 12, 13 and 45 are properly rejected under 35 U.S.C. §103(a) as being unpatentable over Srivastava et al. (U.S. Patent No. 6,621,211) and Ohara et al. (U.S. Patent No. 6,168,892 B1).

3) Whether Claims 14-16, 18-21, 25 and 26 are properly rejected under 35 U.S.C. §103(a) as being unpatentable over Boker et al. (US Patent Publication No. 2004/0056256) in view of Schaepkens et al. (U.S. Patent Publication No. 2004/0051444).

4) Whether Claims 14-20, 25-26, 40 and 43 are rejected properly under 35 U.S.C. §103(a) as being unpatentable over Srivastava et al. (PCT Patent Application No. WO01/89001) in view of Schaepkens et al. (U.S. Patent Application No. 2004/0051444 A1) and either Lowden et al. or Wyner et al. (EP Patent Application No. 0 087 745 A1).

5) Whether Claim 46 is properly rejected under 35 U.S.C. §103(a) as being unpatentable over Srivastava et al. (PCT Patent Application No. WO 01/89001 A2) in view of Ohara et al. (U.S. Patent No. 6,168,892 B1).

VIII. ARGUMENTS (37 C.F.R. 41.37(c)(1)(vii))

A. Claims 1-13 and 45 Fully Comply With the Written Description Requirement Under 35 U.S.C. §112

The Examiner rejected claims 1-13 and 45 as failing to comply with the written description requirement of 35 U.S.C. §112. According to the Examiner, Applicant's removal of $MgFgeO_6:Mn^{4+}$ from the group broadened the claim to a range not supported by the original specification, thus constituted new matter. The Examiner's assertion that the removal of $MgFgeO_6:Mn^{4+}$ essentially adds new matter to the claim is illogical. Page 4, paragraph 0045 of the written description describes an embodiment of the subject invention including all of the elements of claim 1, and specifically including "one or more of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7:Eu,Mn$; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH):Eu,Mn$; $(Sr,Mg,Ca,)MgAl_{10}O_{17}:Eu,Mn$; and $MgFgeO_6:Mn^{4+}$." Therefore, the description allows for one, two or any combination of the phosphors to be sufficient. Certainly, since the description states that the lighting apparatus comprises at least one phosphor from the group, no one phosphor is essential to the invention.

The Federal Circuit, in *Gentry Gallery, Inc. v. Berkline*, established an "essential elements" test to determine if a claim has been broadened during prosecution beyond the scope of the applicant's original disclosure. 134 F.3d 1473, 45 USPQ2d 1498 (Fed. Cir. 1998). The test instructed courts to review the original disclosure and determine what elements are described as "essential" to the invention. Any claim that lacks an essential element is overly broad and unsupported by the specification. Here, the essential elements pertinent to claim 1 include: a light source for emitting radiation having a peak emission in the UV range, and a phosphor composition including $(Sr,Ba,Ca)_2SiO_4:Eu$, and one or more phosphors from the group

$(Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; $(Sr,Mg,Ca,)MgAl_{10}O_{17}$:Eu. As amended, claim 1 includes all essential elements and is therefore properly supported by the written description and does not constitute new matter.

The Examiner fails to support the assertion of new matter or at least explain how the removal of a non-essential element constitutes broadening to a range unsupported by the specification. Therefore, the rejection of independent claim 1, along with claims 2-13 and 45 which depend therefrom, must be withdrawn.

B. Claims 14-26 Fully Comply With the Written Description Requirement of 35 U.S.C. §112.

The Examiner has rejected claims 14-26 under 35 U.S.C. §112 for failing to comply with the written description requirement. Specifically, the Examiner asserts that the removal of the specific chemical composition for magnesium fluorogermanate in independent claim 14 constitutes a broadening unsupported by the original specification, thus constituting new matter.

Similar to the situation above, Applicant has not added any new matter to the claim and has only removed a non-essential element of the claim. The invention embodied in claim 14 requires a UV light source, a phosphor composition comprising one or more garnet phosphors and a magnesium fluorogermanate phosphor. As amended, claim 14 still includes all the essential elements.

The Examiner's assertion that the removal of a chemical composition limitation constitutes new matter is completely unfounded and the Examiner has failed to provide any support for the baseless rejection. Therefore, independent claim 14, along with

claims 15-26 which depend therefrom, is supported by the specification, and the rejection should be withdrawn.

C. Claim 38 Fully Complies with the Written Description Requirement of 35 U.S.C. 112.

The Examiner has rejected claim 38 under 35 U.S.C. 112 for failing to comply with the written description requirement. Specifically, the Examiner asserts that the removal of the specific chemical composition limitation for a magnesium fluorogermanate in independent claim constitutes a broadening unsupported by the original specification, thus constituting new matter.

As stated above, the chemical composition is not an essential element to the claim. The essential elements are, the elements of claim 27 from which claim 38 depends, and one or more of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; $(Sr,Mg,Ca,)MgAl_{10}O_{17}$:Eu,Mn; and a magnesium fluorogermanate phosphor. Not only does the claim require one or more of the cited phosphors, it also recites a magnesium flurogermanate phosphor. The claim does not state that magnesium flurogermanate is a necessity, and it does not require a specific chemical composition, only a magnesium flurogermanate.

The Examiner fails to indicate why the removal of a non-essential chemical composition limitation constitutes new matter. Claim 38, as amended, is fully within the specification. Therefore, the rejection of claim 38 must be withdrawn.

D. Claims 40-43 Fully Comply with the Written Description Requirement of 35 U.S.C. §112.

The Examiner has rejected claim 38 under 35 U.S.C. §112 for failing to comply with the written description requirement. Specifically, the Examiner states that the removal of $MgFgeO_6:Mn^{4+}$ and the removal of "one or more garnet phosphors" having the general formula $(Y,Gd,La,Lu,Tb,Pr,Sm)_3(Al,Ga,In)_5O_{12}:Ce$ substantially broadens the blend to one undisclosed in the original specification, and hence constitutes new matter.

Once again, the Applicant is confused as to Examiners assertion. New matter includes any alteration or addition to the matter originally disclosed. A phosphor blend including $(Sr, Ba,Ca)_2SiO_4:Eu$ and at least one of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7:Eu,Mn$; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH):Eu,Mn$; and $(Sr,Mg,Ca,)MgAl_{10}O_{17}:Eu,Mn$ is disclosed throughout the specification. Specifically, on page 4, paragraph 0043, the description states "in another embodiment...a phosphor composition comprising a blend of a phosphor from one of the above embodiments with one or more additional phosphors." Page 4, paragraph 0045 discloses a phosphor blend, including $(Sr, Ba,Ca)_2SiO_4:Eu$ and one or more of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7:Eu,Mn$; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH):Eu,Mn$; $(Sr,Mg,Ca,)MgAl_{10}O_{17}:Eu,Mn$; and $MgFgeO_6:Mn^{4+}$. Further, as stated in the previous arguments, $MgFgeO_6:Mn^{4+}$is not an essential element of the claim; therefore its removal does not render the claim overbroad. Clearly, the embodiment disclosed in claim 40 is well within the bounds of the written description, and the rejection of claim 40, along with claims 41-43 which depend therefrom, must be withdrawn.

E. Claim 46 Fully Complies With the Written Description Requirement of 35 U.S.C. §112.

The Examiner has rejected claim 46 under 35 U.S.C. §112 for failing to comply with the written description requirement. Specifically, the Examiner claims that the removal of the "one or more garnet phosphors having the general formula $(Y,Gd,La,Lu,Tb,Pr,Sm)_3(Al,Ga,In)_5O_{12}:Ce$" substantially broadens the phosphor composition in the lighting apparatus to one not supported by the specification, thus constitutes new matter.

Applicant yet again fails to understand the Examiner's assertion of new matter. As stated above in Section D, page 4, paragraph 0045 of the disclosure describes a phosphor blend, including $(Sr, Ba,Ca)_2SiO_4:Eu$ and one or more of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7:Eu,Mn$; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH):Eu,Mn$; $(Sr,Mg,Ca,)MgAl_{10}O_{17}:Eu,Mn$; and $MgFgeO_6:Mn^{4+}$. Applicants assert that the Examiner must be confused as to the meaning of new matter, since the specification explicitly discloses the composition of amended claim 46. Claim 46 did not alter or add to the matter originally disclosed; therefore, no new matter has been added, and the rejection of claim 46 must be withdrawn.

F. Claims 1-7, 12, 13 and 45 are Not Obvious Over Srivastava et al. (6,621,211) and Ohara et al. (6,168,892)

The Examiner has rejected claims 1-7, 12, 13 and 45 under 35 U.S.C. §103(a) as being unpatentable over Srivastava (U.S. Patent No. 6,621,211) and Ohara (U.S. Patent No. 6,168,892 B1). The Examiner states that Srivastava teaches a semiconductor light source having a peak emission in a range from 370 nm – 390 nm (within the UV range) and the conversion of the primary light into a mixture of red, blue

and green light. The Examiner admits that Srivastava does not disclose the specific phosphor compositions as claimed; however, states that it would have been obvious to include said phosphors in view of Ohara.

The Examiner's reasoning fails for multiple reasons. Primarily, the Examiner's combination of Srivastava and Ohara fails to disclose or make obvious the blend of phosphors encompassed by the present invention.

Ohara discloses a long list of phosphors, but not the specific phosphor blend of the present invention. The present invention relates to the combination of (Sr, $Ba,Ca)_2SiO_4$:Eu, one or more garnet phosphors having the formula $(Y,Gd,La,Lu,Tb,Pr,Sm)_3(Al,Ga,In)_5O_{12}$:Ce, and at least one of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; and $(Sr,Mg,Ca,)MgAl_{10}O_{17}$:Eu,Mn. Nowhere does Ohara teach or suggest such a combination.

More particularly, Ohara actually teaches away from the invention as set forth in claim 1. It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983). Ohara teaches the use of a blend of phosphors that include a phosphor that has a relatively narrow region of an unwanted absorption of a subtractive color mixture. If absorption peaks show up in an unwanted wavelength region, another fluorescent substance is added to effectively reduce such region. The emission color varies between yellow, magenta and cyan, depending on the desired color. The claimed color blend, on the other hand, has multiple emission peaks such that a white light is produced. The use of various emission peaks to produce white light would defeat the purpose of Ohara which, therefore teaches away from the subject claimed invention.

In the Final Rejection dated September 6, 2007, the Examiner cites *Leshin* to support the assertion that the selection of known materials, generally understood to be suitable to make a device, is obvious if a particular material is selected on the basis of suitability for intended use. See page 5, paragraph 2. However, the Examiner's use of *Leshin* is inapplicable to the present situation. The specific combination of phosphors, as claimed in the present invention, is not generally understood in the field, therefore *Leshin* has no bearing. In *Leshin*, the court considered the use of generally known plastics in a lipstick container and held that since the plastics used are well known, "mere selection of known plastics to make a container-dispenser of a type made of plastics prior to the invention, the selection of the plastics being on the basis of suitability for the intended use, would be entirely obvious." That is not the case here. The phosphor blend is not well known and has not been used prior to this invention. Therefore, Examiner's use of *Leshin* to support the claim of obviousness is unfounded and inappropriate.

Furthermore, even if Ohara disclosed the phosphor blend, Ohara is non-analogous art, which makes it improper to use in an obviousness analysis. See MPEP, §2141.01(a). "In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1446, 24 USPQ2d 1443, 1445 (Fed. Cir. 1992).

Ohara is directed to a color image forming method comprising applying additive color mixing to a subtractive color mixture to improve color hue. This method is not employed with light emission. Conversely, the claimed invention relates to a white light

illumination system for converting UV radiation emitted by a semiconductor light source to white light. According to the Examiner, Ohara's reference in column 6, to "elemental composition is not specifically limited and any phosphor absorbing in the UV to visible region and emitting in the visible region may be usable," proves Ohara's applicability to lighting devices. Applicants respectfully disagree with the Examiner's assertion since the reference is simply describing the phosphors' ability to absorb light in the specified region. Ohara does not teach or even allude to a lighting system, much less a lighting system that employs phosphors. Accordingly, a person skilled in the art would not be expected to search the technical fields to which Ohara belongs, in view of the claimed invention.

The Federal Circuit, in *Pentec v. Graphic Controls*, stressed that "prior art may not be gathered with the claimed invention in mind." 776 F.2d 309, 227 (USPQ 766) (Fed. Cir. 1985). The Federal Circuit set forth a two-part test for determining whether a particular reference is within the appropriate scope of the art. *In re Deminski,* 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986). First, it must be determined whether the reference is "within the field of the inventor's endeavor." Second, if it is determined that the reference is outside that field, as it is here, it must be determined whether the reference is "reasonably pertinent to the particular problem with which the inventor was involved." Here, the problem to be solved by Ohara, forming color images with improved color hue, is neither pertinent to the inventors endeavor nor is it the slightest bit related to the problems addressed by Srivastava and the present invention. Therefore, by employing such a non-analogous reference, the Examiner is using impermissible hindsight to pick and choose desirable elements from prior art references in an attempt to recreate the claimed invention.

G. Claims 14-16, 18-21, 25 and 26 Are Not Obvious Over Boker et al in View of Schaepkens

The Examiner has rejected claims 14-16, 18-21, 25 and 26 under 35 U.S.C. §103(a) as being unpatentable over Bokor et al. (U.S. Patent Publication No. 2004/0056256) in view of Schaepkens et al (U.S. Patent Application No. 2004/0051444 A1). According to the Examiner, Bokor teaches a device capable of emitting white light that includes a UV light source with a peak emission in the UV range, and a phosphor composition coupled to the light source, the phosphor composition comprising (Sr, $Ba,Ca)_2SiO_4$:Eu and a magnesium flurogermanate. Notwithstanding the Examiner's contention, Bokor does not recite (Sr, $Ba,Ca)_2SiO_4$:Eu on the seventh line of page 6, nor does the reference have a ninth page.

Furthermore, the Examiner admits that Bokor does not teach a phosphor composition including one or more garnet phosphors. However, according to the Examiner, it would have been obvious to include such phosphors in view of Shaepkens, "who in a patent application on lighting apparatus including color conversion of primary light emitting apparatus, hence analogous art, teach the inclusion of a garnet phosphor having the general formula as claimed for the specific purpose of absorption of the primary radiation including UV radiation at 390 nm and subsequent emission in the green-to-red portion of the spectrum including in one application the production of white light." The Examiner's assertion is erroneous for a variety of reasons, most significantly, due to the Examiner's failure to provide any compelling motivation or rationale as to why the references should be combined.

Contrary to the Examiner's assertion, electroluminescent (EL) displays and devices do NOT function the same as LEDs. The EL display of Shaepkens includes successive

layers of a substrate, an anode, an organic EL, and a cathode. The Examiner states that regardless of the differences between the two devices, the role of the phosphors is the same. Applicants assert that the Examiner's reasoning is misguided. Although Applicant admits that the role of the phosphors may be similar, this does NOT mean that phosphors used in an EL device would be suitable for use in an LED. Moreover, no evidence exists that all phosphors that function in an EL display would work effectively in a light emitting diode apparatus.

The Examiner cites to KSR's reasoning that there are three possible sources for motivation to combine references are 1) the nature of the problem to be solved, 2) the teaching of the prior art, and 3) the knowledge of persons of ordinary skill in the art. Examiner asserts this test, but fails to use it to support the combination.

Appellants assert that the analysis is not performed because, first, Bokor is concerned with improving the energy efficiency of an illumination device comprising at least one LED and phosphors. Conversely, Shaepkens is directed to providing polymeric articles with a pattern of raised features easily and inexpensively produced for use with EL displays. Combining the teaching of the first and third element of the KSR test, a person having ordinary skill in the art would not look to the teachings of Shaepkens to solve the problem posed in Bokor. Clearly, in light of the differences between an EL device and an LED, and the vastly diverse problems to be solved by each respective patent, Shaepkens and Bokor are non-analagous art and are inappropriate to combine. As is well accepted, if a cited reference is "not analogous art, it has no bearing on the obviousness of the patent claim." *Jurgens v. McKasy*, 18 USPQ2d 1031 (Fed. Cir. 1991).

In addition, even assuming all of the limitations of the present claims can be found by culling from the prior art parameters to fit the claimed invention, it is improper to pick

and choose individual elements from assorted prior art references to recreate the claimed invention without motivation to do so. *Symbol Technologies, Inc. v. Opticon Inc.*, 19 USPQ2d 1241 (Fed. Cir. 1991). No such motivation exists in the cited references (see comment above); therefore, for at least the above reasons, withdrawal of this rejection is required.

H. Claims 14-20, 25-26, 40 and 43 are Not Obvious Over Srivastava et al (WO 01/89001 A2) in View of Schaepkens et al (US 2004/0051444 A1) and Either Lowden et al or Wyner et al (EP 0 087 745)

The Examiner rejected claims 14-20, 25-26, 40 and 43 as being unpatentable over Srivastava in view of Schaepkens and either Lowden or Wyner. With regard to independent claims 14 and 40, the Examiner claims Srivastava teaches a semiconductor light source having a peak emission range from 370 nm-390 nm and a phosphor composition radiationally coupled to the light source; the phosphor composition comprising $(Sr,Ba,Ca)_2SiO_4$:Eu and a magnesium flourogermanate. The Examiner admits that Srivastava does not teach a phosphor composition that also comprises one or more garnet phosphors. However, the Examiner states that it would have been obvious to include one or more garnet phosphors as claimed in view of Schaepkens, who, in a patent application on lighting apparatus including color conversion of primary light from light emitting apparatus, hence analogous art, teach the inclusion of a garnet phosphor having the general formula as claimed...for the purpose of absorption of the primary radiation in a range comprising the peak wavelength of Srivastava. Applicant respectfully disagrees with the Examiner's reasoning.

Srivastava, similar to Bokor, is directed to LED devices for general illumination. Schaepkens, as described in Section I above, is directed to providing polymeric articles

with a pattern of raised features easily and inexpensively produced. Therefore, it is improper to combine Schaepkens and a prior art reference relating to an LED device for general illumination.

Further, with reference to Lowden and Wyner, just because it is possible for specific phosphors to be used in a blend does not mean that the phosphors recited in the subject claims are suggested. Rather, as noted above, there must be some reason why one skilled in the art would use these phosphors over other suitable phosphors. Here there is no such motivation or suggestion. Accordingly, withdrawal of this rejection is respectfully requested.

I. Claim 46 is Not Obvious Over Srivastava et al in View of Ohara

The Examiner has rejected claim 46 as being unpatentable under 35 U.S.C. §103(a) over Srivastava et al (WO 01/89001 A2) in view of Ohara et al (6,168,892 B1). The Examiner admits that Srivastava does not teach the limitation on specific phosphor composition as claimed; however, states that it would have been obvious to include said limitation in view of Ohara.

As stated above in Section F, although Ohara discloses a long list of phosphors, it fails to disclose or even suggest the specific phosphor blend of the present invention. Nowhere does Ohara teach or suggest the specific combination of $(Sr,Ba,Ca)_2SiO_4$:Eu, and at least one phosphor selected from the group consisting of $((Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; and $(Sr,Ba,Ca)MgAl_{10}O_{17}$:Eu,Mn.

Further, it is improper to combine Ohara with Srivastava for multiple reasons. Specifically, Ohara teaches away from the combination with Srivastava and is non-analogous art. Applicant's refer the Examiner to Section F for a complete recitation

of the reasons combination of Ohara and Srivastava is improper. Therefore, the rejection of claim 46 must be withdrawn.

CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections are inappropriate and that claims 1-26, 38, 40-43, 45 and 46 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 1-26, 38, 40-43, 45 and 46.

Respectfully submitted,

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Filed: April 2, 2008

APPENDICES

IX. CLAIMS APPENDIX

Claims involved in the Appeal are as follows:

1. A lighting apparatus for emitting white light comprising:

a semiconductor light source emitting radiation having a peak emission in the UV; and

a phosphor composition radiationally coupled to the light source, the phosphor composition comprising $(Ba,Sr,Ca)SiO_4:Eu$, one or more garnet phosphors having the general formula $(Y,Gd,La,Lu,Tb,Pr,Sm)_3(Al,Ga,In)_5O_{12}:Ce$, and at least one phosphor selected from the group consisting of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7:Eu,Mn$; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH):Eu,Mn$; and $(Sr,Mg,Ca,)MgAl_{10}O_{17}:Eu,Mn$.

2. The lighting apparatus of claim 1, wherein the light source is an LED.

3. The lighting apparatus of claim 2, wherein the LED comprises a nitride compound semiconductor represented by the formula $In_iGa_jAl_kN$, where $0 \leq i$; $0 \leq j$, $0 \leq K$, and $i + j + k = 1$.

4. The lighting apparatus of claim 1, wherein the light source is an organic emissive structure.

5. The lighting apparatus of claim 1, wherein the phosphor composition is coated on the surface of the light source.

6. The lighting apparatus of claim 1, further comprising an encapsulant surrounding the light source and the phosphor composition.

7. The lighting apparatus of claim 1, wherein the phosphor composition is dispersed in the encapsulant.

8. The lighting apparatus of claim 1, further comprising a reflector cup.

9. The lighting apparatus of claim 1, wherein said phosphor composition comprises $(Sr_{0.95}Ba_{0.025}\ Eu_{0.025})_2SiO_4$.

10. The lighting apparatus of claim 1, wherein said phosphor composition comprises $(Sr_{0.58}Ca_{0.036}\ Eu_{0.06})_2SiO_4$.

11. The lighting apparatus of claim 10, wherein said apparatus has a color point with ccx value of 0.5286 and a ccy value of 0.4604.

12. The lighting apparatus of claim 1, wherein said phosphor composition further comprises one or more additional phosphor.

13. The lighting apparatus of claim 12, wherein said one or more additional phosphors are selected from the group consisting of $(Ba,Sr,Ca)_5(PO_4)_3(Cl,F,Br,OH):Eu^{2+},Mn^{2+},Sb^{3+}$; $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)BPO_5:Eu^{2+},Mn^{2+}$; $(Sr,Ca)_{10}(PO_4)_6*nB_2O_3:Eu^{2+}$; $2SrO*0.84P_2O_5*0.16B_2O_3:Eu^{2+}$; $Sr_2Si_3O_{8*2}SrCl_2:Eu^{2+}$; $Ba_3MgSi_2O_8:Eu^{2+}$; $Sr_4Al_{14}O_{25}:Eu^{2+}$; $BaAl_8O_{13}:Eu^{2+}$; $2SrO\text{-}0.84P_2O_{5\text{-}0.16}B_2O_3:Eu^{2+}$; $(Ba,Sr,Ca)Al_2O_4:Eu^{2+}$; $(Y,Gd,Lu,Sc,La)BO_3:Ce^{3+},Tb^{3+}$; $(Ba,Sr,Ca)_2(Mg,Zn)Si_2O_7:Eu^{2+}$; $(Sr,Ca,Ba)(Al,Ga,In)_2S_4:Eu^{2+}$; $(Y,Gd,Tb,La,Sm,Pr,Lu)_3(Al,Ga)_5O_{12}:Ce^{3+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_2:Eu^{2+},Mn^{2+}$; $Na_2Gd_2B_2O_7:Ce^{3+},Tb^{3+}$; $(Ba,Sr)_2(Ca,Mg,Zn)B_2O_6:K,Ce,Tb$; $(Sr,Ca,Ba,Mg,Zn)_2P_2O_7:Eu^{2+},Mn^{2+}$; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):Eu^{2+},Mn^{2+}$; $(Gd,Y,Lu,La)_2O_3:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)_2O_2S:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)VO_4:Eu^{3+},Bi^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $SrY_2S_4:Eu^{2+}$; $CaLa_2S_4:Ce^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $3.5MgO*0.5MgF_2*GeO_2:Mn^{4+}$; $(Ba,Sr,Ca)MgP_2O_7:Eu^{2+},Mn^{2+}$; $(Y,Lu)_2WO_6:Eu^{3}+,\ Mo^{6+}$; $(Ba,Sr,Ca)_xSi_yN_z:Eu^{2+}$.

14. A lighting apparatus for emitting white light comprising:

a UV light source emitting radiation having a peak emission in the UV range; and

a phosphor composition radiationally coupled to the light source, the phosphor composition comprising $(Sr,Ba,Ca)_2SiO_4$:Eu, one or more garnet phosphors having the general formula $(Y,Gd,La,Lu,Tb,Pr,Sm)_3(Al,Ga,In)_5O_{12}$:Ce and a magnesium fluorogermanate phosphor.

15. The lighting apparatus of claim 14, wherein the light source is a semiconductor LED.

16. The lighting apparatus of claim 14, wherein the LED comprises a nitride compound semiconductor represented by the formula $In_iGa_jAl_kN$, where $0 \leq i$; $0 \leq j$, $0 \leq K$, and $i + j + k = 1$.

17. The lighting apparatus of claim 14, wherein said light source is an organic emissive structure.

18. The lighting apparatus of claim 14, wherein the phosphor composition is coated on the surface of the light source.

19. The lighting apparatus of claim 14, further comprising an encapsulant surrounding the light source and the phosphor composition.

20. The lighting apparatus of claim 14, wherein the phosphor composition is dispersed in the encapsulant.

21. The lighting apparatus of claim 14, further comprising a reflector cup.

22. The lighting apparatus of claim 14, wherein said $(Sr,Ba,Ca)_2SiO_4$:Eu phosphor comprises $(Sr_{0.95}Ba_{0.025}\ Eu_{0.025})_2SiO_4$.

23. The lighting apparatus of claim 14, wherein said phosphor composition comprises $(Sr_{0.58}Ca_{0.36}Eu_{0.06})_2SiO_4$.

24. The lighting apparatus of claim 14, wherein said apparatus has a color point with ccx value of 0.5286 and a ccy value of 0.4604.

25. The lighting apparatus of claim 14, wherein said phosphor composition further comprises one or more additional phosphors.

26. The lighting apparatus of claim 21, wherein said one or more additional phosphors are selected from the group consisting of $(Ba,Sr,Ca)_5(PO_4)_3(Cl,F,Br,OH):Eu^{2+},Mn^{2+},Sb^{3+}$; $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)BPO_5:Eu^{2+},Mn^{2+}$; $(Sr,Ca)_{10}(PO_4)_6*nB_2O_3:Eu^{2+}$; $2SrO*0.84P_2O_5*0.16B_2O_3:Eu^{2+}$; $Sr_2Si_3O_{8*}2SrCl_2:Eu^{2+}$; $Ba_3MgSi_2O_8:Eu^{2+}$; $Sr_4Al_{14}O_{25}:Eu^{2+}$; $BaAl_8O_{13}:Eu^{2+}$; $2SrO-0.84P_2O_{5-0.16}B_20_3:Eu^{2+}$; $(Ba,Sr,Ca)Al_2O_4:Eu^{2+}$; $(Y,Gd,Lu,Sc,La)BO_3:Ce^{3+},Tb^{3+}$; $(Ba,Sr,Ca)_2(Mg,Zn)Si_2O_7:Eu^{2+}$; $(Sr,Ca,Ba)(Al,Ga,In)_2S_4:Eu^{2+}$; $(Y,Gd,Tb,La,Sm,Pr,Lu)_3(Al,Ga)_5O_{12}:Ce^{3+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_2$: Eu^{2+},Mn^{2+}; $Na_2Gd_2B_2O_7:Ce^{3+},Tb^{3+}$; $(Ba,Sr)_2(Ca,Mg,Zn)B_2O_6:K,Ce,Tb$; $(Sr,Ca,Ba,Mg,Zn)_2P_2O_7:Eu^{2+},Mn^{2+}$; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):$ Eu^{2+},Mn^{2+}; $(Gd,Y,Lu,La)_2O_3:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)_2O_2S:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)VO_4:Eu^{3+},Bi^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $SrY_2S_4:Eu^{2+}$; $CaLa_2S_4:Ce^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $3.5MgO*0.5MgF_2*GeO_2:Mn^{4+}$; $(Ba,Sr,Ca)MgP_2O_7:Eu^{2+},Mn^{2+}$; $(Y,Lu)_2WO_6:Eu^{3}+$, Mo^{6+}; $(Ba,Sr,Ca)_xSi_yN_z:Eu^{2+}$.

27. A lighting apparatus for emitting white light comprising:

a semiconductor light source emitting radiation having a peak emission in the UV range; and

a phosphor composition radiationally coupled to the light source, the phosphor composition comprising $(Ba,Sr,Ca)SiO_4:Eu$, and one or more additional phosphors, wherein said $(Ba,Sr,Ca)SiO_4:Eu$ phosphor comprises $(Sr_{0.95}Ba_{0.025}\ Eu_{0.025})_2SiO_4$ or $(Sr_{0.58}Ca_{0.036}\ Eu_{0.06})_2SiO_4$.

28. The lighting apparatus of claim 27, wherein the light source is a semiconductor LED.

29. The lighting apparatus of claim 27, wherein the LED comprises a nitride compound semiconductor represented by the formula $In_iGa_jAl_kN$, where $0 \leq i$; $0 \leq j$, $0 \leq K$, and $i + j + k = 1$.

30. The lighting apparatus of claim 27, wherein said light source is an organic emissive structure.

31. The lighting apparatus of claim 27, wherein the phosphor composition is coated on the surface of the light source.

32. The lighting apparatus of claim 27, further comprising an encapsulant surrounding the light source and the phosphor composition.

33. The lighting apparatus of claim 27, wherein the phosphor composition is dispersed in the encapsulant.

34. The lighting apparatus of claim 27, further comprising a reflector cup.

35. Cancelled

36. Cancelled

37. The lighting apparatus of claim 27, wherein said apparatus has a color point with a ccx value or 0.5286 and a ccy value of 0.4604.

38. The lighting apparatus of claim 27, wherein said phosphor composition comprises one or more of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; $(Sr,Ba,Ca)MgAl_{10}O_{17}$:Eu,Mn; and a magnesium fluorogermanate phosphor.

39. The lighting apparatus of claim 32, wherein said one or more additional phosphors are selected from the group consisting of $(Ba,Sr,Ca)_5(PO_4)_3(Cl,F,Br,OH):Eu^{2+},Mn^{2+},Sb^{3+}$; $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+},Mn^{2+}$;

$(Ba,Sr,Ca)BPO_5:Eu^{2+},Mn^{2+}$; $(Sr,Ca)_{10}(PO_4)_6*nB_2O_3:Eu^{2+}$; $2SrO*0.84P_2O_5*0.16B_2O_3:Eu^{2+}$; $Sr_2Si_3O_{8*}2SrCl_2:Eu^{2+}$; $Ba_3MgSi_2O_8:Eu^{2+}$; $Sr_4Al_{14}O_{25}:Eu^{2+}$; $BaAl_8O_{13}:Eu^{2+}$; $2SrO\text{-}0.84P_2O_{5\text{-}0.16}B_20_3:Eu^{2+}$; $(Ba,Sr,Ca)Al_2O_4:Eu^{2+}$; $(Y,Gd,Lu,Sc,La)BO_3:Ce^{3+},Tb^{3+}$; $(Ba,Sr,Ca)_2(Mg,Zn)Si_2O_7:Eu^{2+}$; $(Sr,Ca,Ba)(Al,Ga,In)_2S_4:Eu^{2+}$; $(Y,Gd,Tb,La,Sm,Pr,Lu)_3(Al,Ga)_5O_{12}:Ce^{3+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_2$: Eu^{2+},Mn^{2+}; $Na_2Gd_2B_2O_7:Ce^{3+},Tb^{3+}$; $(Ba,Sr)_2(Ca,Mg,Zn)B_2O_6:K,Ce,Tb$; $(Sr,Ca,Ba,Mg,Zn)_2P_2O_7:Eu^{2+},Mn^{2+}$; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH)$: Eu^{2+},Mn^{2+}; $(Gd,Y,Lu,La)_2O_3:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)_2O_2S:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)VO_4:Eu^{3+},Bi^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $SrY_2S_4:Eu^{2+}$; $CaLa_2S_4:Ce^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $3.5MgO*0.5MgF_2*GeO_2:Mn^{4+}$; $(Ba,Sr,Ca)MgP_2O_7:Eu^{2+},Mn^{2+}$; $(Y,Lu)_2WO_6:Eu^3+$, Mo^{6+}; $(Ba,Sr,Ca)_xSi_yN_z:Eu^{2+}$.

40. A phosphor blend including $(Sr,Ba,Ca)_2SiO_4:Eu$ and at least one of $(Sr,Mg,Ca,Ba,Zn)_2P_2O_7:Eu,Mn$; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH):Eu,Mn$; and $(Sr,Ba,Ca)MgAl_{10}O_{17}:Eu,Mn$.

41. The phosphor composition according to claim 40 comprising $(Sr_{0.95}Ba_{0.025}Eu_{0.025})_2SiO_4$.

42. The phosphor composition according to claim 40, comprising $(Sr_{0.58}Ca_{0.036}Eu_{0.06})_2SiO_4$.

43. The phosphor blend of claim 40, wherein said phosphor blend is capable of absorbing the radiation emitted by a light source having a peak emission in the UV range and emitting radiation that, when combined with said radiation from said light source, produces white light.

44. Cancelled

45. The lighting apparatus of claim 1, wherein said semiconductor light source has a peak emission at about 405 nm.

46. A lighting apparatus for emitting white light comprising:

a semiconductor light source emitting radiation having a peak emission in the UV; and

a phosphor composition radiationally coupled to the light source, the phosphor composition comprising $(Sr,Ba,Ca)_2SiO_4$:Eu, and at least one phosphor selected from the group consisting of $((Sr,Mg,Ca,Ba,Zn)_2P_2O_7$:Eu,Mn; $(Ca,Sr,Ba,Mg)_5(PO_4)_3(Cl,F,OH)$:Eu,Mn; and $(Sr,Ba,Ca)MgAl_{10}O_{17}$:Eu,Mn.

X. EVIDENCE APPENDIX

NONE

XI. RELATED PROCEEDINGS APPENDIX

NONE

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